

## Abstract

[0099] One aspect of the current invention is an optimized synthetic mammalian expression plasmid (e.g. pAV0201). This new plasmid comprise a therapeutic element, and a replication element. The therapeutic element of the new plasmid comprises a eukaryotic promoter; a 5' untranslated region ("UTR"); a codon-optimized-eukaryotic therapeutic gene sequence; and a poly adenylation signal. The therapeutic elements of this plasmid are operatively linked and located in a first operatively-linked arrangement. Additionally, the optimized synthetic mammalian expression plasmid comprises replication elements, wherein the replication elements are operatively linked and located in a second operatively-linked arrangement. The replication elements comprise a selectable marker gene promoter, a ribosomal binding site, and an origin of replication. The first-operatively-linked arrangement and the second-operatively-linked arrangement comprise a circular structure of the codon optimized synthetic mammalian expression plasmid.